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Seizure-related injuries in children and adolescents with epilepsy

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ABSTRACT

Background: Children with epilepsy are reported to be at a greater risk of injuries compared with their peers who do not have epilepsy.
Objectives: We set out to determine the frequency and pattern of seizure-related injuries in children with epilepsy seen at the University College Hospital (UCH), Ibadan, Nigeria.
Methods: Consecutive cases of epilepsy seen at the pediatric neurology clinic of the UCH, Ibadan over a period of 6 months were evaluated for injuries in the preceding 12 months using a structured questionnaire. These were compared with age- and sex-matched controls.
Results: A total of 125 children with epilepsy and 125 age- and sex-matched controls were studied. Injuries occurred more frequently in children with epilepsy than in their peers ($p = 0.01$, OR 1.935, 95% CI 1.142–3.280). Epilepsy was generalized in 80 (64.0%), and localization-related in 45 (36.0%). Idiopathic epilepsy accounted for 74 (59.2%), and the remaining 51 (40.8%) had remote symptomatic epilepsy. Fifty-seven (45.6%) children had suffered seizure-related injuries with multiple injuries in 31 (24.8%). The most frequent were skin/soft tissue lacerations (26.4%), injuries to the tongue and soft tissues of the mouth (19.2%), minor head injuries (15.2%), and dental injuries with tooth loss (8.0%). There was a statistically significant association between seizure frequency and seizure-related injuries ($p = 0.002$). Children on polytherapy had a significantly higher frequency of seizure-related injuries ($p < 0.001$).
Conclusion: Epilepsy is a major risk factor for injuries in childhood. High seizure frequency increases the risk of multiple injuries in children with epilepsy.

1. Introduction

Children with epilepsy have been reported to be at a higher risk of injuries, and the risk of seizure-related injuries has often been a major source of concern for caregivers of children with epilepsy [1,2]. The loss of awareness during seizure events and falls which are often sudden and unexpected have been reported to increase the risk of injuries in individuals with epilepsy [3]. Seizure-related injuries that have been reported vary from mild injuries requiring little or no treatment to severe ones necessitating admissions and, sometimes, surgical interventions [3,4]. The increased risk of mortality among people with epilepsy is well documented, and individuals with epilepsy have an increased risk of dying from an accident compared with the general population [5,6].

The increased risk of injuries associated with epilepsy has major implications for the overall quality of life of the affected individuals who often have limitations placed on their sporting, driving, and leisure activities [3]. Injuries can interfere with day to day living, schooling, and functional independence. The burden is greater in the developing countries of the world, particularly African countries where epilepsy is associated with a high level of stigmatization, a wide treatment gap, and limited access to medical care [7,8].

There are few reports on the pattern of seizure-related injuries in African children with epilepsy. Understanding the pattern and risk factors for injuries in African children will provide valuable information to improve care and the health-related quality of life in children with epilepsy. This study set out to determine the frequency and pattern of seizure-related injuries in a cohort of Nigerian children with epilepsy.

2. Methods

The study was a case–control study involving children with epilepsy and their age- and sex-matched counterparts who do not have epilepsy. The UI/UCH Ethics Review Committee gave ethical approval for the study. Consecutive cases of epilepsy seen at the pediatric neurology clinic of the University College Hospital (UCH), Ibadan over a period of 6 months were evaluated by means of a standardized questionnaire following informed consent obtained from the caregivers. The UCH is a tertiary center and a University Teaching Hospital. The pediatric neurology clinic serves as the main referral center for children with neurological disorders in the southwestern part of Nigeria and receives referrals

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from primary and secondary levels of care in the region. The hospital provides access to all children in the region, across all socioeconomic classes.

Each child was evaluated by a child neurologist, and the diagnosis of epilepsy was based on a detailed history with an accurate eyewitness account and electroencephalographic (EEG) findings. The classification of the epileptic seizure and epilepsy syndrome was based on the Commission on the Classification and Terminology of the International League Against Epilepsy [9]. A child was considered eligible for the study if he/she was aged ≥5 years and had been diagnosed with of epilepsy. Information obtained from each patient included name, age, gender, age at first seizure, frequency of seizures, date of last seizure, duration of longest seizure-free period, etiology of seizures, classification of seizure types, antiepileptic drug therapy, any previous adverse drug reactions, and any associated neurological comorbidities.

Children with epilepsy and their caregivers were requested to give information on any injuries sustained within the preceding 12 months and any injuries sustained on account of a seizure. Information obtained on seizure-related injuries included the following: any burns/scalds, wounds, soft tissue injuries, head injuries, dental injuries, and fractures. In addition, each child was evaluated for a history of seizures which occurred while bathing or swimming. Details of the injuries sustained, treatment given, previous hospitalizations, and any complications were also recorded.

Age- and sex-matched children without epilepsy seen at the general children's outpatient clinic were selected as controls. Information on any injuries sustained within the preceding 12 months was obtained. Total sample size in each group was 125. This was based on scientific sample size calculation. The sample size was calculated assuming a 2-sided Type 1 error of 5% and 80% power to detect a difference if such exists. Using a previous estimate of 12.6% for injuries in children with epilepsy [10] and a minimum clinically important difference of ten percentage points that the study sought to detect between children with epilepsy and controls, we obtained a minimum sample size of 106 per group. A nonresponse adjustment of 10% gave the minimum sample size as 118, and 125 subjects were studied in each group.

Data were entered into a microcomputer, and statistical analysis was performed by the SPSS version 20.0. Means of continuous variables were compared using the Student's t-test while categorical variables were compared by means of the Chi-square test. Association between seizure variables and injuries was tested using the Chi-square test. Level of significance was set at $p < 0.05$.

3. Results

A total of 125 children with epilepsy and 125 age- and sex-matched controls were studied. Their ages showed a normal distribution and ranged from 5 to 17.2 years in the group with epilepsy and 5 to 17.5 years in the control group, with a mean age of 121.4 (SD = 41.2) months and 125.3 (SD = 22.4) months respectively. The male to female ratio was 1.5:1 in the group with epilepsy and the control group, with 75 males and 50 females in each group. Table 1 shows the types of epilepsy in the cohort, with generalized epilepsy in 80 (64%) and localization–related epilepsy in 45 (36%). Idiopathic epilepsy accounted for 74 (59.2%) of epilepsies and remote symptomatic epilepsy, 51 (40.8%). Forty-seven (37.6%) had associated neurological comorbidities, and the most frequent were learning disability in 44 (35.2%), cerebral palsy in 20 (16.0%), attention-deficit hyperactivity disorder in 15 (12.0%), visual impairment in 10 (8.0%), and hearing impairment in 6 (4.8%).

Table 1
Epilepsy types in 125 children and adolescents.

Type of epilepsy	Number of cases (n)	%
Generalized		
Generalized tonic–clonic	67	53.6
Atonic	6	4.8
Childhood absence	5	4.0
Myoclonic	2	1.6
Partial		
Complex partial	23	18.4
Partial secondarily generalized	17	13.6
Simple partial	5	4.0
Total	125	100.0

All the children were on antiepileptic drugs (AEDs), and compliance was rated as satisfactory in 102 (81.6%) but unsatisfactory in 23 (18.4%). Ninety-one (72.8%) were on monotherapy while the remaining 34 (27.2%) were on polytherapy, with 22 (17.6%) on 2 AEDs and 12 (9.6%) patients on a combination of 3 AEDs.

Fifty-seven (45.6%) of the children with epilepsy reported having sustained seizure-related injuries in the preceding 12 months while injuries occurred in the preceding 12 months in 26 (20.8%) of the children in the control group. There was a statistically significant higher frequency of injuries in the group with epilepsy ($p = 0.010$, OR 1.935, 95% CI 1.142, 3.280). Table 2 shows the pattern of injuries, and 31 (24.8%) had suffered multiple injuries. The most common types of injuries were skin and soft tissue injuries (26.4%), injuries to the mouth and tongue (19.2%), and head injuries (15.2%). Other types of injuries included dental injuries with tooth loss (8.0%) and accidental burn injury (2.4%). One patient had suffered a road traffic accident as a result of a seizure. Twenty (16.0%) had experienced a seizure while having a bath but none of the patients had experienced a seizure while swimming.

The injuries were rated as mild, not requiring a visit to the hospital in 35 (61.4%); moderate, requiring a visit to the hospital but not hospital admission in 17 (29.8%); and severe in 5 (8.8.%), necessitating hospital admission. All the head injuries were minor injuries, mainly scalp lacerations and abrasions. The burn injury was accidental in three cases. The treatment received in the 57 children after the injuries were simple dressing (56.1%), dental treatment (17.5%), skin/scalp suturing (7.0%), and hospital admission (8.8%).

Table 3 shows the bivariate association between some seizure variables and the risk of seizure-related injuries in children with epilepsy. Children with frequent seizures of at least 1 episode/week were more likely to have injuries ($p = 0.002$, OR 4.080, 95% CI 1.606, 10.365) and were also more likely to have multiple injuries ($p = 0.006$, OR 3.916, 95% CI 1.464, 10.476). Children on polytherapy, i.e., >1 AED, were more likely to have injuries related to seizure events ($p = <0.001$, OR 0.093, 95% CI 0.034, 0.255). Injuries occurred more frequently in children with epilepsy and associated neurological comorbidities, but the difference was not statistically significant ($p = 0.188$, OR 1.554, 95% CI 0.702, 3.442). Seizures during baths occurred more frequently in children with associated neurological comorbidities ($p = 0.008$, OR 4.676, 95% CI 1.393, 15.684).

4. Discussion

Children with epilepsy have been reported to have an increased risk of injuries which vary from mild to severe and, thus, increased morbidity, mortality, and economic burden [3,11]. Our study showed a significantly higher frequency of injuries in children with epilepsy compared with their age- and sex-matched counterparts. This observation is consistent with previous reports that children with epilepsy have an

Table 2
Pattern of injuries in 125 children and adolescents with epilepsy.

Type of injury	Number of cases (n)	%
Skin laceration/abrasions	33	26.4
Injuries to the tongue/mouth	24	19.2
Head injury (scalp lacerations/abrasions)	19	15.2
Dental injuries with tooth loss	10	8.0
Burns	3	2.4

Thirty-one (24.8%) had multiple injuries.